

## Method for forming fluorinated ionomers

**Description of Technology:** This invention concerns a method for forming ionomers by treatment with ammonium carbonate of copolymers having a substantially fluorinated, but not perfluorinated, polyethylene backbone having pendant groups of fluoroalkoxy sulfonyl fluoride. Ionomers derived therefrom by ion exchange are useful in electrochemical applications such as batteries, fuel cells, electrolysis cells, ion exchange membranes, sensors, electrochemical capacitors, and modified electrodes.

## **Patent Listing:**

1. **US Patent No.** 6,713,567, Issued on March 30, 2004, "Method for forming fluorinated ionomers" <a href="http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=6,713,567.PN.&OS=PN/6,713,567&RS=PN/6,713,567

Market Potential: Because of its high dielectric constant, high electrochemical stability, and desirable swelling properties, poly(vinylidene fluoride) is known in the art of lithium batteries as a highly desirable material for use as a membrane separator. For example Gozdz et al. (U.S. Pat. No. 5,418,091) disclose porous PVDF homopolymer and copolymer containing solutions of lithium carbonates in aprotic solvents useful as separators in lithium batteries.

It is further known in the art, and hereinbelow shown, that PVDF homopolymers and copolymers are subject to attack by strong bases such as the alkali metal hydroxides taught in the art hereinabove cited. Of particular importance is that the attack of basic nucleophiles on a copolymer of VDF and perfluorovinyl ethers results in the removal of the vinyl ether moiety from the polymer, see W. W. Schmiegel in Die Angewandte Makromolekulare Chemie, 76/77 pp 39ff, 1979. Since the highly preferred monomer species taught in the art, and exemplified by DuPont's Nafion and similar products, for imparting ionomeric character to various polymers is a vinyl ether terminated by a sulfonyl halide functionality, the sensitivity to base attack of the VDF copolymer formed therewith has prevented the development of a single-ion conducting ionomer based upon VDF. There simply is no means taught in the art for making the ionomer.

## **Benefits:**

Forms fluorinated ionomer

## **Applications:**

 Batteries, fuel cells, electrolysis cells, ion exchange membranes, sensors, electrochemical capacitors, and modified electrodes